

Education

University of Illinois at Urbana-Champaign

PhD in Computer Science

URBANA-CHAMPAIGN, ILLINOIS, USA

Aug 2014 – May 2020

Advisors: Prof. David Forsyth and Prof. Alexander Schwing

Thesis Committee: Svetlana Lazebnik, Dhruv Batra, Alexander Schwing and David Forsyth

Thesis Title: Learning Multiple Solutions to Computer Vision Problems

International Institute of Information Technology

B. Tech. with Masters of Science by Research in Computer Science

HYDERABAD, INDIA

Aug 2008 – Jul 2014

Advisor: Prof. P J Narayanan

Thesis: Combining Data and Task Parallelism on CPU and GPU Machines

Professional Experience

Amazon – AI Labs (*Managers:* Avinash Ravichandran, Marzia Polito, Onkar Dabeer) SEATTLE, USA Applied Scientist II, AWS Computer Vision Science Sep, 2019 - Present

- I research and develop novel computer vision and machine learning algorithms. I write production code to launch the algorithms into AWS Computer Vision services.
- These services are used by many AWS customers and this helps democratize the use of computer vision and machine learning.

Amazon – AI Labs (*Manager:* Joseph Tighe) SEATTLE, USA Applied Scientist Intern May, 2018 - Aug, 2018

- I developed an algorithm to detect visual relationships i.e. interactions between two objects in an image such as man plays guitar, woman kicks football etc.
- The algorithm was ranked 10th on leader-board among 140+ submissions in Kaggle competition for ECCV'18 workshop – Open Images Challenge, Visual Relationship Detection Track (Poster).

Apple Research (*Managers:* Luciano Spinello, Tie-qi Chen) CUPERTINO, USA Computer Vision Research Intern May, 2015 - Aug, 2015 & May, 2016 - Aug, 2016

- I developed a real-time parallel implementation of a stereo algorithm on GPU.
- I implemented a deep learned feature descriptor to match corners of objects in different images.

Google Inc (*Manager:* Rajesh Chandrashekar) BENGALURU, INDIA Software Engineering Intern May, 2011 - Aug, 2011

- I wrote code for backend & UI of Google Apps C-panel to launch useful features in production.
 - The code was written in Java and Google Web Toolkit library, and end-to-end tested with Selenium.
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Awards and Service

- Best GPU Paper Award at IEEE International Conference on High Performance Computing (Dec, 2013).
 - Outstanding Reviewer Award for IEEE/CVF CVPR 2018 and IEEE/CVF CVPR 2020.
 - Top-400 reviewer for NeurIPS 2019, selected to mentor at New in ML workshop.
 - Outstanding contribution in reviewing by Journal of Parallel and Distributed Computing (Jun, 2016).
 - Reviewer for Conferences: CVPR, ICCV, ECCV, NeurIPS, ICML, UAI, ACCV, AAAI, BMVC.
 - Reviewer for Journals: TPAMI, TIP, JPDC, JACM.
 - Awarded Google Summer of Code scholarship to work on CUDA acceleration of OpenJPEG (2012).
 - Received the Dean's Merit List (2008) and Research Award (2012) of IIIT Hyderabad.
 - Received the National Talent Search Scholarship (2006), awarded to top-1000 10th graders across India.
 - Merit position in school exams of Junior Maths Olympiad, National Standard Exam in Physics.
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Selected Talks

- Amazon Machine Learning Conference, 2019, Oral presentation of "A linearized framework and a new benchmark for model selection for fine-tuning."
- IEEE/CVF Computer Vision and Pattern Recognition 2019, Oral Presentation of "Fast, Diverse and Accurate Image Captioning Guided By Part-of-Speech", see the talk here.
- At – Google AI, Facebook AML, Apple 3D Vision & Illinois CSL Student Conference, 2019 – Invited Talk on "Learning Multiple Solutions to Computer Vision Problems."
- CS 445 Computational Photography by Prof. Derek Hoiem, 2017, Lecture on "The image as a virtual stage."

- [CS 598 Data Driven Design](#) by Prof. Ranjitha Kumar, 2017, Lecture on “Generative Adversarial Networks.”
- 2017 Midwest Computer Vision Workshop, Chicago, “Learning Diverse Image Colorization.”
- 2016 Midwest Computer Vision Workshop, Chicago, “Learning Large-Scale Automatic Image Colorization.”
- IEEE International Conference on High Performance Computing, 2013, Oral Presentation of “Can GPUs Sort Strings Efficiently?”
- IEEE International Conference on High Performance Computing, 2011, Oral Presentation of “Hybrid Implementation of Error-Diffusion Dithering.”

Publications

- A linearized framework and a new benchmark for model selection for fine-tuning, arxiv pre-print. *Aditya Deshpande, Alessandro Achille, Avinash Ravichandran, Hao Li, Luca Zancato, Charless Fowlkes, Rahul Bhotika, Stefano Soatto and Pietro Perona.*
 - Fast, Diverse and Accurate Image Captioning Guided By Part-of-Speech, In Proceedings of IEEE/CVF CVPR’19 (**Oral**). *Aditya Deshpande*, Jyoti Aneja*, Liwei Wang, Alexander Schwing and David Forsyth.*
 - Visual Relationship Detection, In ECCV’18 Open Images Challenge Workshop. *Aditya Deshpande et al.*
 - Convolutional Image Captioning, In Proceedings of Computer Vision and Pattern Recognition (CVPR’18). *Jyoti Aneja*, Aditya Deshpande* and Alexander Schwing* (*= equal contribution).
 - Learning Diverse Image Colorization, In Proceedings of Computer Vision and Pattern Recognition (CVPR’17). *Aditya Deshpande, Jiajun Lu, Mao-Chuang Yeh, Min Jin Chong and David Forsyth.*
 - Recovering the 3D Geometry of Heritage Monuments from Image Collections, In Digital Hampi: Preserving Indian Cultural Heritage, Springer. *Rajvi Shah, Aditya Deshpande, Anoop Nambodiri, P J Narayanan.*
 - Learning Large-Scale Automatic Image Colorization, In Proceedings of International Conference on Computer Vision (ICCV’15). *Aditya Deshpande, Jason Rock and David Forsyth.*
 - Fast Burrows Wheeler Compression Using All-Cores. In Ashes workshop of International Parallel and Distributed Processing Symposium (IPDPSW’15) (**Oral**). *Aditya Deshpande and P J Narayanan.*
 - Multistage SFM: Revisiting Incremental Structure from Motion, In Proceedings of International Conference on 3D Vision (3DV’14). *Rajvi Shah, Aditya Deshpande and P J Narayanan.*
 - Top Down Approach to Detect Multiple Planes from Pair of Images, ACM ICVGIP’14 (**Oral**). *Singhal et al.*
 - Can GPUs Sort Strings Efficiently? In Proceedings of IEEE HiPC’13 (**Oral**). *Aditya Deshpande and P J Narayanan. (Best GPU Paper awarded by Nvidia)*
 - Geometry Directed Browser for Personal Photographs, In ACM ICVGIP’12 (**Oral**). *Deshpande et al.*
 - Hybrid Implementation of Error-Diffusion Dithering, In IEEE HiPC’11 (**Oral**). *Deshpande et al.*
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Projects and Technical Contributions

- **Fast, Diverse and Accurate Image Captioning.**
Developed an AI algorithm that writes a sentence to describe any image. Different humans will describe the image in different ways; our method can also generate multiple descriptions. The code available at <https://github.com/aditya12agd5/convcap> is widely used (125 stars, 39 forks, 250+ citations).
- **Model selection for fine-tuning.**
In this work I developed an algorithm to pre-select the right model to fine-tune from a model zoo without performing any training. This algorithm is used in a production AutoML system to fine-tune on customer data by using models from a large model zoo.
- **Learning to colorize black and white images.**
Developed an AI algorithm to add color to black-and-white image; this can help colorize old photos and movies automatically. Further improved this algorithm to produce multiple versions of color photos. Some results available at <https://bit.ly/2NdD4f7>. The code is made available at <https://github.com/aditya12agd5/divcolor>.
- **Multi-stage structure-from-motion and 3D Photo Browser.**
Developed a multi-stage algorithm for structure-from-motion that first builds a coarse 3d model and then densifies it with more points and camera. This makes structure-from-motion much faster than standard bundler and visual sfm methods. This method is used to create an immersive 3d photo browser.
- **GPGPU/CUDA – Fast dithering, string sorting and file compression**
Developed a fast dithering algorithm for GPUs; this is a vital component of daily-use printers. Developed a fast string sorting algorithm; it is useful for many software applications such as genomics. Developed a parallel algorithm to improve speed of bzip data compression and made file compression on computers faster. The code is available at https://github.com/aditya12agd5/cuda_stringsort & https://github.com/aditya12agd5/cuda_bzip2.